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U. S. DEPARTMENT OF AGRICULTURE.

DIVISION OF BOTANY.

AMERICAN GINSENG:

ITS

COMMERCIAL HISTORY, PROTECTION, AND CULTIVATION.

BY

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LETTER OF TRANSMITTAL.

U. S. DEPARTMENT OF AGRICULTURE,
DIVISION OF BOTANY,
Washington, D. C., December 8, 1891.

SIR: I have the honor to transmit for publication as Bulletin No. 16 of the Division of Botany a report on American Ginseng: Its Commercial History, Protection, and Cultivation, collated by Mr. G. V. Nash, under the immediate direction of the Botanist. This report has been prepared in response to a popular demand for information on the cultivation of American ginseng. The bulletin brings out the facts that the wholesale price of American ginseng has steadily increased from 52 cents per pound in 1858 to somewhat more than \$3 per pound in 1893, and that the value of the export for the past decade has amounted to between \$600,000 and \$1,000,000 per year. The report also points out the fact that the natural supply is now rapidly decreasing, and that its extermination, if present conditions continue, is inevitable. At the same time there can be no question but that the cultivation of ginseng is entirely practicable, and this information on the subject of cultivating the plant is therefore submitted to those interested. The ultimate success of ginseng culture must, however, depend upon the result of a commercial test, having in view the possibility of overstocking the market through a widely increased source of production.

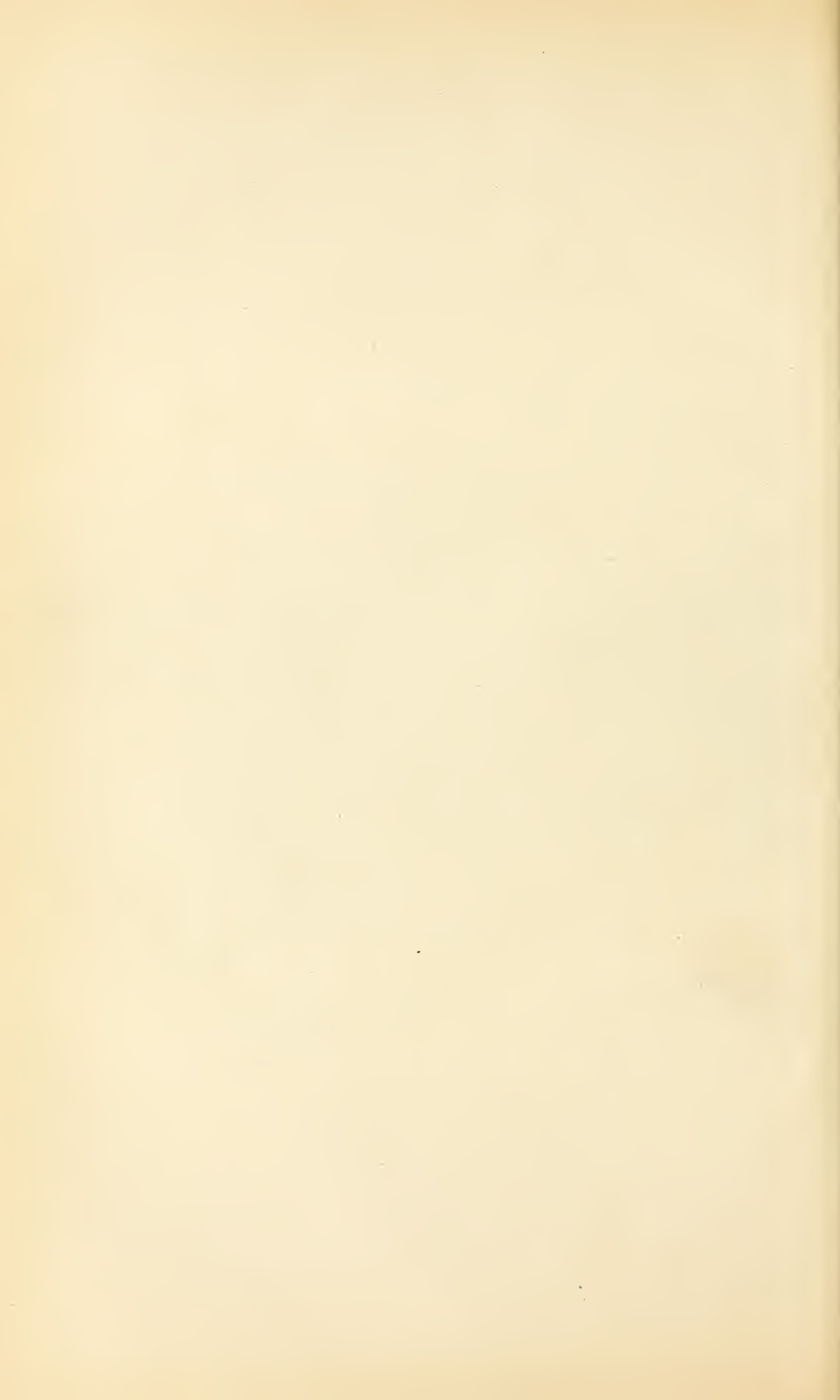
Respectfully,

FREDERICK V. COVILLE, *Botanist.*

Hon. CHAS. W. DABNEY, Jr.,
Assistant Secretary of Agriculture.

CONTENTS.

| | Page. |
|------------------------------|-------|
| History..... | 5 |
| Description..... | 6 |
| Range..... | 7 |
| Medicinal properties..... | 8 |
| Commercial value..... | 10 |
| Exportation..... | 12 |
| Protection..... | 14 |
| Cultivation..... | 16 |
| Chemical analysis..... | 20 |
| The seed..... | 20 |
| Preparation of the root..... | 21 |
| Profits..... | 22 |



AMERICAN GINSENG: ITS COMMERCIAL HISTORY, PROTECTION, AND CULTIVATION.

By GEORGE V. NASH.

HISTORY.

The American ginseng (*Panax quinquefolium*)¹ belongs to the natural order *Araliaceae*, a family of plants closely related to the parsley family, in which latter are included the parsnip, carrot, and celery. Our plant is a near relative of the ginseng of China and Korea, *Panax ginseng*, which is so highly prized by the Chinese. A report of the high estimation in which this plant was held in China reached Europe early in the eighteenth century, and led to inquiries as to whether it grew in the forests of North America. Father Lafitau, a missionary among the Iroquois Indians, after long search and inquiry among them, found a plant which answered well the description of the Chinese ginseng, as given by Father Jartoux, a missionary in China in the early part of the eighteenth century. This discovery was made near Montreal, Canada, in 1716.²

Soon afterwards the French began collecting it, through the agency of the Indians, for export to China. The demand thus created was so large that ginseng presently became an important article of commerce in Canada. The first consignments were very profitable to the traders, the root, valued at but 2 francs per pound in Quebec, selling as high as 25 francs in China. At that time the Company of the Indies controlled the trade with that country. At first they allowed the officers of their vessels to carry ginseng as a private speculation, supposing that the trade would amount to little. In 1751, however, perceiving that the commerce in the root was becoming extensive, they withdrew this privilege and assumed the trade themselves. Ginseng was at this time worth about 12 francs per pound in Canada, but the company soon paid 33 francs for it. The trade continued to advance until 1752, when, in the effort to meet an excessive demand from France, a poor lot of root was placed on the market. The merchants at Rochelle directed their agents in Quebec to purchase ginseng at any price. The agents accordingly caused a large amount to be collected out of season, and

¹*Aralia quinquefolia* Decsne. and Planch.

²Lafitau, Joseph-François, *Memoire concernant la precieuse plante du ginseng*, p. 22. Nouvelle edition, Montreal, 1858.

this was improperly dried in ovens. Even the poor material thus obtained brought about 25 francs per pound in Quebec, and a quantity was shipped to Rochelle, amounting in value to 500,000 francs. A part of this was sent on to China, where the people refused to use it. The Canadian root thus acquired a bad reputation among the Chinese, so that by 1754 the trade was reduced to a value of 33,000 francs, and soon afterwards entirely ceased.¹

About this time the existence of ginseng in the more southern colonies began to be recognized. In 1750 it was found in the western parts of New England generally,² and in 1751 it was discovered in central New York and at Stockbridge, Mass.³ It was found plentifully in Vermont at the time of the settlement of that State, and the parties who dug the root sold it in its crude form for about 2 shillings, or 34 cents per pound.⁴

As population moved westward ginseng was met in abundance as far as the first tier of States beyond the Mississippi. An export trade was eventually developed which in Wisconsin is reported to have reached a value of \$40,000 in 1858 and \$80,000 in 1859. Large quantities have also been shipped from Minnesota.

DESCRIPTION.

The ginseng plant is rather conspicuous and is easily recognized. The main stem rises about a foot above the ground and then divides into what appear to be branches, but are really the stalks of compound leaves. These are generally three in number, sometimes four or five, and from 3 to 4 inches long. Each bears five thin leaflets, occasionally three or seven, palmately arranged, two of them only an inch or two long, the remainder 3 to 4 inches, egg-shaped in outline, with the broad end away from the stem, abruptly pointed, and saw-toothed. From the junction of the leafstalks the stem is continued into an erect flower stalk, from 2 to 5 inches long, bearing in July a cluster of small, yellowish-green flowers. These are soon followed by the fruit, which develops rapidly, remaining green until August, when it begins to turn red, becoming scarlet late in August or in September, when it is fully ripe. The berries, which are edible and have the taste of the root, are of about the size of peas, and each contains two seeds or occasionally three.

The part of the plant commercially important is the root. This is composed of two parts, the rootstock and the root proper. The former is slender, rarely reaching one-fourth of an inch in diameter, and is marked by a number of scars. These are left by the stems, which die

¹Lafitau, Joseph-François, *loc. cit.*, pp. 5-8.

²Williams, Samuel, *Natural and Civil History of Vermont*, p. 70 (1794).

³Speer, Rev. William, *The Oldest and Newest Empire; China and the United States*, p. 61 (1870).

⁴Thompson, Z., *History of Vermont*, part I, p. 221 (1842).

down in autumn, so that each indicates a year in the life of the plant. As many as twenty-eight of them have been found on a single root-stock. The root itself is spindle-shaped, often forking below. It is from three-fourths to 1 inch thick, and is marked with transverse wrinkles.

In New York State ginseng begins to throw up its first shoots about May 1, and by June the leaves attain their full size. Elsewhere the time varies according to latitude and elevation.

Ginseng does not spread by the root, and its only mode of reproducing itself is by its seed. Hence it will be readily seen that the plant will soon be exterminated where it is persistently gathered before the seed has matured and fallen.

There is another reason why ginseng should not be dug in summer. At that time the plant is growing and the root is taxed to supply the required nutriment. Under these circumstances, of course, the root is in poor condition, and unfit for the use for which it is sought. In the autumn, however, after the seed

has fallen the root will be in prime condition. By that time it has laid up a store of nutriment for use in the spring, until the plant begins again to draw food from the soil. For this reason the root is heavier in the autumn, and firmer, and will then shrink much less in drying. Accordingly, a given number of plants will yield a greater weight of roots at this season, and also, the same weight of green roots will realize more than if collected in the growing season.

RANGE.

The Chinese ginseng grows principally between the 39th and 47th degrees of north latitude, and the 126th to the 136th degrees of east longitude.¹ The American plant has about the same range of lati-

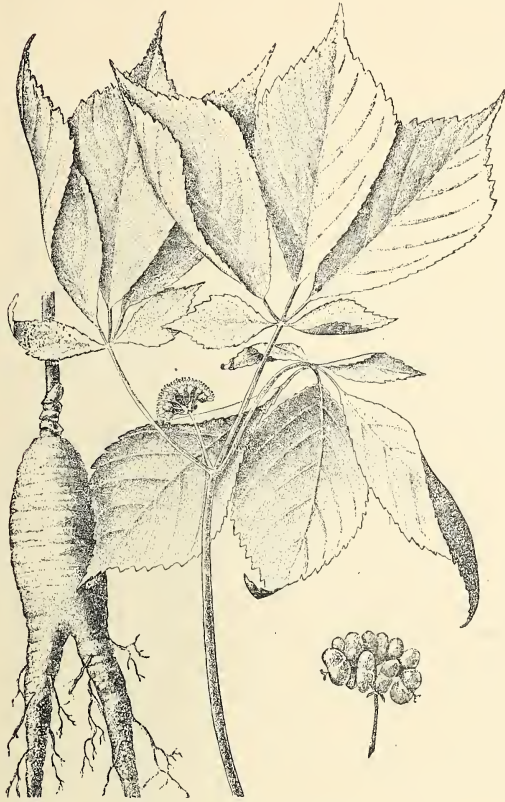


FIG. 1.—American ginseng.

¹Jartoux, Father, The Description of a Tartarian Plant Called Gin-seng. From the Philosophical Transactions of the Royal Society of London, Vol. XXVIII, p. 240 (1714).

tude, except that it extends farther south along the mountains. It grows in rich and damp, but not wet or muddy soils, such as prevail in hardwood forests, and it is found in the following States:

| | |
|--------------------------|--------------------------|
| Maine. | South Carolina, western. |
| New Hampshire. | Georgia, northern. |
| Vermont. | Alabama, northern. |
| Massachusetts, western. | Kentucky. |
| Rhode Island. | Tennessee. |
| Connecticut. | Arkansas. |
| New York. | Ohio. |
| New Jersey, northern. | Indiana. |
| Pennsylvania. | Illinois. |
| Delaware. | Michigan. |
| Maryland. | Wisconsin. |
| Virginia. | Minnesota. |
| West Virginia. | Iowa. |
| North Carolina, western. | Missouri. |

It formerly grew abundantly over large areas in these States, but it has been so energetically hunted, and at the same time the forest area has been so much diminished, that the supply is greatly reduced. In Canada it is pretty generally distributed throughout Ontario and Quebec, but it has now become rather scarce.

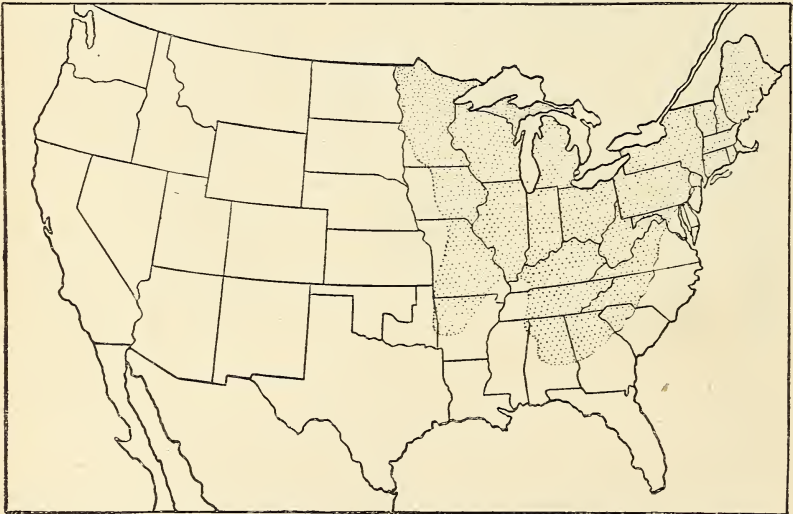


Fig. 2.—Map showing the natural range of the American ginseng plant.

MEDICINAL PROPERTIES.

In this country ginseng is considered of little medicinal value. The root is mildly aromatic and slightly stimulant. The Chinese, however, place a high value on it, and, indeed, regard it as a panacea. Father Jartoux, while making a map of Tartary under the orders of the Emperor of China, spent some time in Manchuria, where the most valued ginseng grows. The following is his description of the uses to which the Chinese put this root:

They affirm that it is a sovereign remedy for all weaknesses occasioned by excessive fatigues either of body or mind; that it dissolves pituitous humors; that it cures weakness of the lungs and the pleurisy; that it stops vomitings; that it strengthens the stomach and helps the appetite; that it disperses fumes or vapors; that it fortifies the breast, and is a remedy for short and weak breathing; that it strengthens the vital spirits, and increases lymph in the blood; in short, that it is good against dizziness of the head and dimness of sight, and that it prolongs life in old age.¹

Dr. F. P. Smith, a medical missionary of recent times, makes the following statement:²

This drug is prepared as an extract, or a decoction, in silver vessels as a rule. Its effects are apparently those of an alterative, tonic, stimulant, carminative, and demulcent nature. It is prescribed in almost every description of disease of a severe character, with few exceptions, but with many reservations as to the stage of the disease in which it may be administered with the greatest benefit and safety. All forms of debility, spermatorrhea, the asthenic hemorrhages, the various forms of severe dyspepsia, the persistent vomiting of pregnant women, malarious affections of a chronic character, the typhoid stages of fever, especially of an epidemic character, are occasions on which the Chinese resort to this drug. Several cases in which life would seem to have been at least prolonged by the taking of doses of this drug, so as to allow of intelligent disposition of property, indicate that some positive efficacy of a sustaining character does really exist in this species of ivywort. The leaves are sold in bundles of the green, fragrant, excellently preserved foliage of the shrub. They are said to be emetic and expectorant in their effects.

That the Chinese faith in ginseng rests largely on fanciful grounds is apparent from their preferring roots in the measure of their resemblance to the human form. A rude likeness of this kind is frequently discernible, which is said to be increased by manipulation. The name itself signifies "man plant." An analogous case is that of the mandrake of the Mediterranean region, long esteemed potent for a similar reason.

The root appears to be differently employed according to the source from which it is obtained, probably somewhat on real and somewhat on fictitious grounds. "The effects of the Manchurian and Korean ginseng are apparently those of an alterative, tonic, stimulant, and carminative nature, while the American and Japanese ginseng are used as demulcent and refrigerant agents."³

The use of ginseng in different parts of the Empire seems to vary considerably. The following statement is made on this point:

In the north it is rarely taken except in cases of actual sickness, as the soil and climate are dry and cool, and there is comparatively little malaria. A few of the wealthy people occasionally take an infusion as a precautionary measure during the winter. * * * It is said to be more extensively used by Chinese in the south, owing to the heat and moisture of their soil and climate, being infused with most of their drinks and taken even with some of their solid food as a precautionary measure against sickness.⁴

There are stated to be three ways of taking ginseng, viz, as pills,

¹ Jartoux, Father, loc. cit., p. 238.

² Chinese Materia Medica, p. 103 (1871).

³ Edwin Stevens, United States Consular Reports, No. 46, Vol. XIV, p. 232 (1884).

⁴ J. J. F. Bandinel, United States Consular Reports, No. 46, Vol. XIV, p. 234 (1884).

confection, and infusion. Its medicinal value is thought to be diminished by a steaming process to which it is frequently subjected for the improvement of its color. It appears to be given the character of a confection by steeping in honey or by the use of sugar.

COMMERCIAL VALUE.

The wild ginseng of Manchuria is the most highly esteemed, now represented, according to Dr. Smith, by that coming from Shingking. This is and has long been an imperial monopoly. A passage from Father Jartoux describes the control exercised in his day:

The places where the ginseng grows are on every side separated from the province of Quan-tong (which in our old maps is called Leaotum) by a barrier of wooden stakes which encompasses the whole province, and about which guards continually patrol to hinder the Chinese from going out and looking after this root. Yet however vigilant, their greediness after gain incites the Chinese to lurk about privately in these deserts, sometimes to the number of two or three thousand, at the hazard of losing their liberty and all the fruit of their labors if they are taken either as they go out of or come into the province.

The Emperor, having a mind that the Tartars should have the advantage that is to be made of this plant rather than the Chinese, gave orders this present year, 1709, to 10,000 Tartars to go and gather all that they could of the ginseng, upon condition that each person should give his Majesty two ounces of the best, and that the rest should be paid for according to its weight in fine silver. It was computed that by this means the Emperor would get this year about 20,000 Chinese pounds of it, which would not cost him above one-fourth part of its real value.¹

A recent consular authority² presents a classification, the first grade in which is named and described as follows:

“Imperial ginseng,” so called because it is raised or gathered under imperial protection in the parks or hunting grounds, where it is kept free from the profanation of the vulgar herd. This variety ranges from \$40 to \$200 per pound, and is largely taken up by the wealthy classes in Peking and vicinity, as far as I can learn. It is fine in its appearance, quite in the desired form, and of course very scarce in trade.

The Korean ginseng seems to be regarded as the next best quality, and apparently includes both a wild and a cultivated product. It is said to have about the same qualities as the former, but it is much cheaper, and therefore much more extensively used. This quality is stated to be marketable at from \$15 to \$35 per pound.

According to the authority cited, “the third grade, called native ginseng, is grown in China near the borders of Korea. This is mostly used to adulterate the Korean article, and is valued at from \$1 to \$10 per pound.” To this may correspond in some measure a native product noted by Dr. Smith, consisting of the roots of species of *Campanula* and *Adenophora*, used as a substitute for ginseng and called by its name.

¹Loc. cit., p. 240.

²I. F. Shephard, United States Consular Reports, No. 46, Vol. XIV, p. 228 (1884).

Regarding further grades, the above consular authority says:

American ginseng is generally regarded as next in classification, but from all I can learn of it I think it belongs rather to the third class, and the last as fourth. When crude it averages about \$2 per pound; when clarified, from \$4 to \$6, and when reclarified, from \$6 to \$8 per pound. What the clarifying may be I have no absolute information. Some maintain it is only washing and clearing the roots from earth and fibers, and some that it is a process of steeping with honey, which is only done with the best selected specimens.

As stated by the same writer, "The last and poorest quality is the Japanese ginseng, which, like the native product, is used for the adulteration of the Korean supply and other better grades." Its value is correspondent to that of the native article, i. e., \$1 to \$10 per pound. According to Dr. Smith, the Japanese ginseng is often adulterated with the roots of *Campanula glauca* and other plants.

Another consular writer,¹ who notes that ginseng is classified as clarified and crude, speaks as follows of the American export:

The root is sorted previous to shipment to China, and comprises various grades, differing from each other in value from \$50 to \$100 per picul. The average prices for crude (which forms the bulk of the shipments), according to the following classifications, are: Superior selected root, \$450; large and selected, \$380; good ordinary, \$300; medium good, \$270; fair, \$250. Some very choice, large roots have brought \$600 to \$700, and extra choicest, large and heavy, sometimes command fancy prices, up to \$1,000 per picul.¹

It is elsewhere stated² that "an old root resembling the body of a man with head and limbs is supposed to be one or two hundred years old, and fetches an enormous price—from 200 to 400 taels per ounce weight." A tael is about \$1.05 in our money. Presumably none but the Manchurian article would attain this valuation.

Something will be said upon "clarification" under the topic of "Preparation of the root." It seems clear that the term is used in two senses.

The collector or grower of ginseng will be particularly interested to know the prices obtainable in this country. Messrs. Samuel Wells & Co., of Cincinnati, Ohio, large dealers in ginseng root, have furnished the following table of prices paid for it by wholesale buyers during the past five years:

Prices paid for ginseng in the United States in the five years from 1889 to 1893.

| | Fair. | Choice. |
|-------------------------------|--------|---------|
| Price per pound in 1889 | \$2.40 | \$3.40 |
| 1890 | 2.75 | 4.00 |
| 1891 | 2.50 | 3.50 |
| 1892 | 2.50 | 3.50 |
| 1893 | 2.25 | 3.50 |

¹ F. D. Cheshire, United States Consular Reports, loc. cit., p. 227. The picul equals about $133\frac{1}{3}$ pounds.

² J. J. F. Bandinel, United States Consular Reports, loc. cit., p. 233.

It is obvious from both the Chinese and the American figures that quality is a highly important consideration. The best root at present comes from Pennsylvania, New York, northern Ohio, Vermont, and Canada. That obtained from the Central and Northwestern States brings from 50 to 75 cents less per pound than that from the above-named States, and that from the Southern States from 80 cents to \$1 less.

EXPORTATION.

The greater part of the ginseng exported from this country enters China by the way of Hongkong. According to Mr. Cheshire¹ the receipts at that port from 1860 to 1883, inclusive, averaged about 417,500 pounds per annum. Half the amount, he states, "comes direct to native importers and others through agents in New York and San Francisco, and the other half to an American firm from western America." The following general table, compiled from the reports of the United States Treasury Department, represents the American trade in ginseng with all countries for thirty-six years:

Exports of ginseng from the United States to various countries from 1858 to 1893.

| Year. | Country to which exported. | Pounds. | Total pounds. | Price per pound. | Average price per pound. | Amount. | Total amount. |
|----------|---|---------|---------------|------------------|--------------------------|-----------|---------------|
| 1858.... | China | | 366,053 | | \$0.52 | | \$193,736 |
| 1859.... | do | | 110,426 | | .49 | | 54,204 |
| 1860.... | do | | 395,909 | | .74 | | 295,766 |
| 1861.... | do | | 347,577 | | .84 | | 292,899 |
| 1862.... | China and Japan..... | 622,761 | | \$0.64 | | \$403,058 | |
| | Holland and all Dutch colonial possessions..... | 1,206 | | .66 | | 800 | |
| | Liberia and other African ports..... | 6,747 | | .70 | | 4,732 | |
| | | | 630,714 | | .64 | | 408,590 |
| 1863.... | China and Japan..... | | 372,945 | | .79 | | 295,120 |
| 1864.... | do | | 360,950 | | 1.31 | | 474,920 |
| 1865.... | China | 464,357 | | 1.17 | | 547,378 | |
| | Germany | 150 | | 1.83 | | 275 | |
| | | | 464,507 | | 1.17 | | 547,653 |
| 1866.... | China | | 444,398 | | .86 | | 382,870 |
| 1867.... | do | | 479,974 | | 1.11 | | 535,883 |
| 1868.... | do | | 370,066 | | 1.02 | | 380,454 |
| 1869.... | do | | a 282,405 | | 1.02 | | 288,054 |
| 1870.... | do | | 474,310 | | .95 | | 455,097 |
| 1871.... | do | 111,221 | | 1.05 | | 117,585 | |
| | Japan | 3,000 | | .60 | | 1,800 | |
| | | | 114,221 | | 1.04 | | 119,385 |
| 1872.... | China | 399,710 | | .85 | | 340,686 | |
| | Japan | 1,550 | | .60 | | 930 | |
| | | | 401,260 | | .85 | | 341,616 |
| 1873.... | China | 274,861 | | .96 | | 264,605 | |
| | England..... | 42,580 | | 1.26 | | 53,764 | |
| | Japan | 32,700 | | .69 | | 22,775 | |
| | | | 350,141 | | .97 | | 341,144 |
| 1874.... | China | 315,523 | | 1.03 | | 326,253 | |
| | England..... | 84,596 | | 1.12 | | 121,941 | |
| | Japan | 500 | | 1.13 | | 566 | |
| | | | 400,619 | | 1.12 | | 448,760 |
| 1875.... | China | 446,679 | | 1.29 | | 577,382 | |
| | England..... | 45,908 | | 1.71 | | 75,454 | |
| | Japan | 6,900 | | .88 | | 6,090 | |
| | | | 497,487 | | 1.32 | | 658,926 |
| 1876.... | China | 477,018 | | 1.15 | | 551,012 | |
| | England..... | 65,873 | | 1.32 | | 87,336 | |
| | Japan | 7,733 | | 1.11 | | 8,606 | |
| | | | 550,624 | | 1.17 | | 646,954 |

a Estimated from total amount.

¹ Loc. cit., p. 226.

Exports of ginseng from the United States to various countries from 1858 to 1893—Cont'd.

| Year. | Country to which exported. | Pounds. | Total pounds. | Price per pound. | Average price per pound. | Amount. | Total amount. |
|----------|------------------------------|----------|---------------|------------------|--------------------------|------------|---------------|
| 1877.... | China | 363, 686 | 440, 406 | \$1. 26 | \$1. 32 | \$460, 330 | \$562, 268 |
| | England..... | 76, 480 | | 1. 32 | | 101, 598 | |
| | Japan..... | 240 | | 1. 41 | | 340 | |
| 1878.... | China | 387, 153 | 421, 395 | 1. 17 | 1. 18 | 454, 037 | 497, 247 |
| | England..... | 27, 802 | | 1. 25 | | 34, 959 | |
| | Japan | 3, 427 | | 1. 24 | | 4, 260 | |
| | United States of Colombia.. | 3, 013 | | 1. 32 | | 4, 000 | |
| 1879.... | China | 360, 436 | 391, 264 | 1. 18 | 1. 24 | 427, 327 | 465, 611 |
| | England | 24, 948 | | 1. 24 | | 31, 124 | |
| | Japan | 5, 880 | | 1. 21 | | 7, 160 | |
| 1880.... | China | 371, 016 | 391, 083 | 1. 35 | 1. 36 | 503, 727 | 533, 042 |
| | England | 20, 067 | | 1. 46 | | 29, 315 | |
| 1881.... | China | 325, 070 | 338, 841 | 1. 64 | 1. 65 | 536, 308 | 561, 545 |
| | England | 13, 771 | | 1. 83 | | 25, 237 | |
| 1882.... | China | 261, 577 | 262, 728 | 1. 83 | 1. 83 | 480, 912 | 483, 171 |
| | England | 1, 151 | | 1. 96 | | 2, 259 | |
| 1883.... | China | 411, 957 | 414, 023 | 2. 05 | 2. 04 | 845, 346 | 848, 393 |
| | England | 1, 648 | | 1. 29 | | 2, 135 | |
| | Japan | 418 | | 2. 18 | | 912 | |
| 1884.... | China | 295, 204 | 295, 242 | 2. 08 | 2. 08 | 614, 935 | 614, 995 |
| | Hawaiian Islands..... | 38 | | 1. 57 | | 60 | |
| 1885.... | China ..... | ..... | 377, 345 | ..... | 1. 99 | ..... | 751, 168 |
| 1886.... | do ..... | ..... | 467, 608 | ..... | 2. 13 | ..... | 998, 332 |
| 1887.... | do ..... | ..... | 330, 831 | ..... | 2. 08 | ..... | 689, 735 |
| 1888.... | do | 308, 231 | 308, 365 | 2. 13 | 2. 13 | 657, 062 | 657, 358 |
| | Japan | 134 | | 2. 20 | | 296 | |
| 1889.... | China ..... | ..... | 271, 228 | ..... | 2. 33 | ..... | 634, 091 |
| 1890.... | do ..... | ..... | 223, 113 | ..... | 2. 71 | ..... | 605, 233 |
| 1891.... | do ..... | ..... | 283, 000 | ..... | 3. 39 | ..... | 959, 392 |
| 1892.... | do ..... | ..... | 228, 916 | ..... | 3. 51 | ..... | 803, 529 |
| 1893.... | do ..... | ..... | 251, 205 | ..... | 3. 15 | ..... | 792, 928 |
| Exports | for 36 years, 1858-1893..... | ..... | 13, 111, 179 | ..... | 1. 42 | ..... | 18, 620, 669 |

Recapitulation, showing advance in price.

| | Total pounds. | Average price per pound. | Total amount. |
|--------------------------------------|---------------|--------------------------|---------------|
| Exports for 11 years, 1858-1868..... | 4, 343, 519 | \$0. 88 | \$3, 862, 095 |
| Exports for 10 years, 1869-1878..... | 3, 932, 868 | 1. 10 | 4, 359, 451 |
| Exports for 10 years, 1879-1888..... | 3, 577, 330 | 1. 84 | 6, 603, 350 |
| Exports for 5 years, 1889-1893..... | 1, 257, 462 | 3. 01 | 3, 795, 773 |

Recapitulation by countries, showing number of pounds exported to each, from 1858-1893.

| | Pounds. |
|--|--------------|
| China and Japan..... | 12, 697, 201 |
| England | 402, 824 |
| Liberia and other African ports | 6, 747 |
| United States of Colombia..... | 3, 013 |
| Holland and all Dutch colonial possessions | 1, 206 |
| Germany | 150 |
| Hawaiian Islands..... | 38 |

From the above it will be seen that China takes practically all the ginseng exported from this country, for that which went to England undoubtedly was used in her trade with China.

An examination of the first table will show that, while there has been a decrease in the quantity exported annually, there has been a much more rapid increase in the price. These changes are owing to the greatly increased demand for the American root in China, and the diminishing supply of our wild product. Summarizing for two periods of five years each, we have—

| | Pounds. | Price. | Amount. |
|------------------------|-----------|--------|-------------|
| From 1858 to 1862..... | 1,850,679 | \$0.67 | \$1,245,195 |
| From 1889 to 1893..... | 1,257,462 | 3.01 | 3,793,773 |

Thus the number of pounds exported during the last five years has been about one-third less, but the price per pound about four and one-half times greater than during the five years from 1858 to 1862. It thus appears that a considerably larger supply than we possess could be sold at the present time within the limits of profit. The continuance of the demand may be argued from the conservative character of the Chinese. They have used ginseng for many centuries, and will doubtless continue to use it for a long time to come. It becomes a practical question then, how we can maintain and perhaps increase our supply. The two obvious means to this end are the protection of the wild crop from abuse by an appeal to reason and by law and the enlargement of the yield, if possible, by artificial plantations.

PROTECTION.

The reduction of our forest areas and the pasturing of those which remain contribute seriously to the failure of the wild crop. The importance of ginseng is hardly sufficient to have much bearing on the forest question; but, so far as our forests shall be preserved for other reasons, there are two lines along which the law may act toward the preservation of the ginseng supply. The first of these lies in the direction of limiting the time of digging the root. The close season should extend at least from the time the plant starts in the spring until the seed is fully ripe in the fall; for, as we have already seen, ginseng has no means of reproduction except its seed, while at the same time the root is not in good condition during the growing period. It might be wise to make the open season still shorter than this would imply in order to still further reduce the collection. The question may be raised, also, whether the destruction of undergrown roots might not be prohibited, as in the case of small trout and lobsters in some States. If this provision were somewhat difficult to enforce, it would at least call attention to the wastefulness of killing the young plant.

The State of Virginia already has a law limiting the time of collecting, of which the text is as follows:¹

¹ Acts and Joint Resolutions of Virginia, 1875-76, chap. 90.

AN ACT for the protection of ginseng in the counties of the State.

SEC. 1. *Be it enacted by the General Assembly of Virginia*, If any person shall dig any ginseng from the 15th day of March till the 15th day of September, such person, on conviction before a justice of the peace, shall be fined not less than five nor more than ten dollars and costs for each offense.

SEC. 2. *Be it further enacted*, That on the conviction of anyone of such offense, the informant shall be entitled to one-half the fine, the remaining half going to the Commonwealth.

SEC. 3. This act shall be in force from its passage.

In the same line, but more stringent, is a law passed by the legislature of Ontario, Canada, in 1891: ¹

SEC. 1. Except for the purpose of clearing or bringing land into cultivation, no person shall, between the first day of January and the first day of September in any year, cut, root up, gather, or destroy the plant known by the name of ginseng whenever such plant may be found growing in a wild or uncultivated state.

SEC. 2. Any person who contravenes the provision of this act shall, for every such offense, upon summary conviction before any justice of the peace, be subject to a penalty of not less than five dollars or more than twenty dollars, together with costs for prosecution, and one-half of the penalty shall be paid to the prosecutor, unless otherwise ordered by the said justice convicting.

On May 27, 1893, the following amendment to the above law was passed: ²

AN ACT to further provide against the extermination of the plant called ginseng.

SEC. 1. Proof of the purchase or sale of ginseng between the first day of January and the first day of September in any year shall be prima facie evidence of a contravention of this act.

SEC. 2. Any person who purchases ginseng, knowing the same to have been cut, rooted up, or gathered between the first day of January and the first day of September shall be guilty of a contravention of this act.

SEC. 3. In any prosecution under the preceding section proof that the ginseng purchased has been illegally obtained by the vendor shall be prima facie evidence of a contravention of this act by the purchaser.

SEC. 4. This act shall be read as part of the act to prevent the extermination of the plant called ginseng.

From the foregoing it will be seen that the season in Virginia opens half a month later than in Ontario, which is right in view of the difference of latitude. On the other hand, the open season is six months long in Virginia, while in Ontario it is but four months long, and the digging must practically cease with the fall of snow. Considering the comparative mildness of the Virginia winter, a six months' close seems rather short.

A second method of securing protection consists in defending the rights of individual landowners, that is, by prohibiting digging on any land but one's own. The legislature of West Virginia has enacted a law of this purport. It covers the case of other medicinal roots as well as ginseng. The text is as follows: ³

¹ Statutes of the Province of Ontario, 1891, chap. 52.

² Statutes of the Province of Ontario, 1893, chap. 43.

³ Acts of West Virginia, 11th session, 1872-73, chap. 158.

SEC. 1. It shall be unlawful for any person to dig ginseng, or other medicinal roots, or prospect for the same on the land of another, in the counties of Pocahontas, Greenbrier, and Webster, without the consent of the owner or owners thereof first had and obtained.

SEC. 2. The provisions of this act shall extend to all the counties of the State: *Provided*, That the county court of any county may, upon the petition of one hundred voters of the county, direct to have the same enforced in their said county or any district or districts thereof.

SEC. 3. Any person violating this act shall be deemed guilty of a misdemeanor, and upon conviction thereof shall be fined not more than fifty dollars, and be confined in the county jail not exceeding two months.

SEC. 4. This act shall be in force from and after the passage thereof.

While a law of this kind does not prevent a man from exterminating ginseng on his own land, it may be assumed that, where the crop is valued, every individual will be prudent enough to husband his own resources. A wanton destruction is most likely to take place on land which is practically public, where no one is sure of anything but what he seizes at once. Nevertheless, in a State having large areas of mountainous and thinly settled territory, landowners in many cases either could not or would not care to secure the enforcement of the law; at any rate would do no more than secure payment for the right of digging, and some further provision would be required. A suitable close season might be established to affect at least the lands not guarded by their owners.

Ginseng under cultivation would naturally enjoy the same protection as any other planted crop. Since plantations would generally be made in woodlands, some special provision may be needed, particularly where the digging of the wild plant on the lands of others is not forbidden. The owner of the plantation might be required to post a prohibitory notice.

Other States than those mentioned do not appear to have legislated in behalf of ginseng.

CULTIVATION.

The cultivation of ginseng is practiced to some extent in northern China and Korea, and has frequently been attempted in this country, but never till recently with success. One of the successful growers of ginseng is Mr. George Stanton, of Summit Station, Onondaga County, N. Y., who has experimented largely for the past six or seven years. He has furnished a detailed account of his methods, from which the following is compiled:

There are two ways in which a start may be made in the cultivation of ginseng, viz. by transplanting the wild roots and by sowing seed. By the latter method from four to seven years are required to produce the first crop of marketable roots, and the land yields no income in the meanwhile. The more speedy and better plan is to transplant wild roots of different ages. This is to be done in the fall of the year, the seed of the plants being collected at the same time and sown in

the manner to be described hereafter. The following autumn dig up the roots and replant all that are not of marketable size, sowing all the seed yielded by the bed. Repeat this every fall, and thus, from the time the first crop of roots from seed is obtained, a regular annual harvest will be provided for. Not only so, but the plantation will grow larger year by year so long as the owner chooses to plant the whole crop of seed. On the other hand, the neglect of sowing a single season will show itself in a failure of crop some future year.

Ginseng can be cultivated in the orchard, garden, or forest. The seed may be sown in any secluded place in the woods without elaborate preparation, and left to nature and time to produce a crop of roots; but this is a slow process. The best method is to sow in a bed prepared in the forest, where the plants may be protected from the grazing and trampling of stock. In this way the plant would be given its natural environment; but it is necessary so to locate the beds as to prevent the digging of the roots, either accidentally or designedly, by hunters of the wild plant.

If there is no suitable piece of woods, a garden or orchard is the best place for growing ginseng; but if the open garden is chosen, shade must be provided.

Any light, loose, rich soil will answer. Well-rotted horse manure may be used to good advantage in the preparation of the bed. If the soil is ordinarily rich, a good wheelbarrow load for a bed 3 feet by 16 feet is sufficient. If the soil is light and sandy more manure must be used; if very rich, less. A good way to form the outlines of the bed is to set up boards 6 inches wide, held in position by stakes. A convenient width is 3 feet. A bed of this width and 4 feet long is ample for planting 1 ounce of seed.

Either roots or seed can be planted in a bed thus prepared. If seed, sow in drills 2 or 3 inches apart and 1 inch deep at the rate of 1 seed per inch. Ginseng seed must never be allowed to get dry, but must be kept in a moist condition. The soil must, therefore, never be allowed to bake. To prevent this, cover the bed with muck or leaf loam, or some kind of mulching, thus imitating the surroundings of the wild plant. Then place a lot of old brush on the mulch as a protection until the plants come up, which is usually in about eighteen months from the time of sowing. If the seed is sown in the fall of 1895 it may be expected to germinate in the spring of 1897.

The beds do not require any special care. All weeds, of course, must be kept down. Do not stir the soil, however, to accomplish this—pull the weeds. Be sure and provide shade, either natural or artificial, as the plants are scalded by the direct rays of the sun. Each autumn, after the plants have died down, a top-dressing of well-rotted horse manure is beneficial.

When the plants are 2 or 3 years old, they may be transplanted to other beds similarly prepared, being set from 4 to 6 inches apart each

way. Shade must again be provided, and when this is done ginseng will endure drought as well as most vegetable crops. In its wild state it inhabits well-shaded woods, and to cultivate it successfully the plant must be given as nearly as possible its natural environment.

When the plants are from four to seven years old, they are to be dug up in the fall, after the seed is gathered. They should then be sorted, all that are large enough for the market being taken out and the remainder replanted. In digging the roots great care should be exercised not to mutilate them, as their value is increased in proportion to their freedom from blemishes.

In garden culture there is some loss of young plants from the attacks of snails and insects. The roots are also subject to injury by worms.

Mr. H. P. Kelsey, of Kawana, N. C., who also cultivates ginseng, pursues essentially the same methods as those followed by Mr. Stanton.

Mr. J. W. Sears, of Somerset, Ky., another grower of ginseng, has kindly furnished the information from which the following is compiled:

He had on his farm a rich north hillside, well timbered, from which all the undergrowth was grubbed up and the saplings and large timber thinned out, enough being left for shade. The ground was then cleared of all weeds and dry leaves, and made mellow by spading, the resultant soil being a loose, rich humus. The beds were 2 feet wide with a walk of 1 foot between them. Roots and seeds were planted 4 inches apart in cross rows, very large roots farther apart, the distance between the rows being 9 inches. The seeds were planted in the autumn, while fresh, and before the falling of the leaves, in order that the latter might act as a mulch, and protect the bed from freezing. He also has similar beds prepared on open lands. Their surface is covered with about 2 inches of humus. After the seeds and roots are planted, the beds are covered with leaves and brush for winter protection. In the spring frames are placed over them, on which a lot of brush is thrown. This allows the rain to fall through and yet affords the requisite shade.

The following is an extract from an article on the Cultivation of Ginseng, by Mr. A. S. Fuller, which appeared in the *American Agriculturist* for December, 1890 (p. 645):

It appears to thrive best in loamy soils, such as are usually found in sugar maple and oak forests at the North. Shade seems also to be essential, for when the plants are exposed to the direct rays of the sun they soon die out, and for this reason open field or garden cultivation of the plants has rarely or never been attended with success. The proper way to start a plantation is to select a piece of land at the edge of some forest where the plants are found growing wild. Then clear out all the underbrush and small trees, leaving just enough of the large ones to afford the shade required. This should be done in spring or during the summer. Then break up the surface of the soil with a harrow, steel rakes, hoes, or other implements, to the depth of 2 or 3 inches, removing all weeds, grasses, and their roots. The bed thus prepared will be ready for the reception of seeds and small unsalable roots as collected in the autumn, the season of ripening depending somewhat upon latitude.

Ginseng berries are of a crimson [scarlet] color when ripe, each containing two seeds, and are produced in small clusters at the top of a central peduncle, elevated above the principal leaves. When gathering the seed the roots may also be dug up, and all small and unsalable ones preserved and replanted in the prepared bed. The seed should be rubbed from the pulp very carefully with the hand, and then sown, or better, pressed into the ground with the finger, about half an inch deep, and one every 6 inches along the row. The rows should be from one to two feet apart for convenience of removing weeds, should they appear. Both seed and plants should be in the ground before hard frosts occur in autumn, for when these come the leaves of the large trees will fall on the bed and give the natural protection required.

The following season no cultivation will be needed—if the bed is thinly covered with leaves—except to cut out sprouts and remove any large coarse, weeds which may spring up from seeds or roots left in the ground. If winds blow away the leaves needed as a mulch, a few old dead branches of trees may be scattered about to hold the mulch in place. At the end of the third season the roots will have reached a marketable size and may then be dug, and the same bed worked over and restocked with seeds or small plants.

These different instructions harmonize in the main, and a method of ginseng culture for this country may be said to be pretty well worked out. With this result we may compare some data relating to Chinese and Korean methods of culture. The following facts are contained in a letter from Mr. Nicholas Pike, formerly United States consul at Port Louis, Mauritius:

Two methods of cultivating ginseng are followed by the Chinese, viz, growing from seed, and transplanting young plants found in the wild state. A spot is selected in the dark, damp woods, generally where the soil is rich and loamy. The seeds are gathered when they drop from the plant to the ground. After the soil is dug over, these seeds are sown broadcast, and covered with dead leaves partially decomposed. This plantation they call their nursery. In from fifteen to eighteen months the young shoots appear above the ground, and as soon as they are 2 or 3 inches high, they are removed to the permanent plantation, and in three years more the roots are ready for the market. Whenever a root is taken from the ground a young plant is set in its place, so that a plantation once formed is producing all the time.

Another authority¹ makes the following statement concerning the cultivation of ginseng in North China:

It grows best in sandy soil. The seed is sown in spring, the roots are taken up in autumn, stored in a room, the temperature of which is above freezing point, and covered with dry earth. Next spring they are planted out, and again lifted and stored in autumn, and this process is annually repeated until the ginseng (sometimes in the fourth year, sometimes in the fifth) has attained its full growth.

In Korea the cultivation of ginseng is carried on in the following manner:

The seeds are sown in the spring in beds of fine leaf mold, no manure being used. The beds are raised about a foot and a half, are protected from the north winds, and screened at night with mats, an awning of mats being placed over the bed during the fierce heat of summer. At the end of the first year the plants are set out, and it

¹J. J. F. Bandinel, United States Consular Reports, loc. cit., p. 233.

takes five or six years for them to reach maturity. The yearly range of temperature at Songdo is wide, say from zero to 90° F.¹

The oriental method thus appears not to agree wholly with the results of experiments on the American plant. The Koreans, and in some cases the Chinese, would seem to plant seed in the spring, which is not generally advisable in this country on account of the difficulty of preserving the seed. Indoor storage seems hardly called for in case of a plant which endures the severity of a Canadian winter. Yet we must remember that under its natural conditions it is heavily protected by standing forests, fallen leaves, and a thick blanket of snow. If grown on exposed ground, therefore, it will at least need the covering of leaves advised by the American growers.

The nursery feature described in the first of the quotations would make it possible to give the freshly germinated plants any special care they may need, and also enable one to keep his beds always full of growing plants. Since the seed requires eighteen months to germinate, a bed will appear very uneven if the place of grown roots is filled only by seed. Mr. George Stanton in this country makes use of "forest nursery beds for germinating seed."²

CHEMICAL ANALYSIS.

The following fertilizer analysis³ of ginseng root may be of value to anyone experimenting with ginseng fertilizers:

| Substance. | In the dried root. | In the ash. |
|----------------------|-----------------------|------------------|
| | <i>Per cent.</i> | <i>Per cent.</i> |
| Crude ash..... | 5.278 | ..... |
| Nitrogen..... | 1.660 | ..... |
| Lime..... | .856 | 16.22 |
| Phosphoric acid..... | .535 | 10.14 |
| Potash..... | .776 | 14.70 |

THE SEED.

While the root is the principal source of income from the plant, the seed is in demand for the purpose of planting and will form an incidental source of profit. Ginseng produces seed quite freely, as many as 152 grains having been taken from a single head. An ounce contains in the neighborhood of 500 seeds.

It is a difficult seed to handle, as it must never be allowed to get dry. When once thoroughly dry it will not germinate and is worthless. If it is to be used by the grower, it is advisable to sow it as soon as gathered. If, however, it is to be stored to fill subsequent orders, it should be packed in moist loam. In this manner it can be kept a year in proper condition for germination.

¹Bulletin of Miscellaneous Information, Royal Gardens, Kew, No. 64, p. 107 (1892).

²Vick's Illustrated Monthly Magazine, December, 1893, p. 23.

³Prof. Alfred M. Peter, Report of Kentucky Agricultural Experiment Station, 1892, p. 19.

PREPARATION OF THE ROOT.

The preparation of the root for the market is a very important matter. Large amounts of good roots are materially injured by improper treatment after they are taken from the ground. To prepare them properly, they must be washed clean in water with a broom or brush. If there is a large amount to prepare at one time, place the roots in a tub with plenty of water and with a stiff broom wash thoroughly. Pour off this water and add fresh, and repeat the operation four or five times. Such as may not then be clean finish with a hand brush.

They are now ready to be dried, and great care must be used in doing this not to scald or burn them. This drying may be done in the sun or by a moderate artificial heat, and the quicker it can be accomplished, without overheating, the better will be the appearance of the root. As the demand is for entire and perfect roots, cutting or splitting must never be resorted to in order to hasten the drying. The root shrinks considerably during the process, losing about two-thirds in weight. The cultivated root is said not to shrink so much in drying as the wild, and, if this is the case, it will prove a more profitable article.

When thoroughly dry, place in paper sacks or clean boxes and keep protected from dust. The root is now ready for shipment and can be sent to the wholesale buyers.

A process employed by the Chinese to produce a yellowish translucent appearance in the root, which adds to its value in their estimation, is thus described by Father Jartoux:

They take care to wash it well and cleanse it with a brush from all extraneous matter. Then they dip it into scalding water, and prepare it in the fume of a sort of yellow millet, which communicates to it a part of its color. The millet is put into a vessel with a little water, and boils over a gentle fire; the roots are laid upon small transverse pieces of wood over the vessel, and are thus prepared, being covered with a linen cloth or some other vessel placed over them. They may also be dried in the sun or by the fire; but then, though they retain their virtue well enough, yet they have not that yellow color which the Chinese so much admire. When the roots are dried, they must be kept close in some very dry place; otherwise they are in danger of corrupting or being eaten by worms.¹

According to Mr. Pike, the ginseng now grown in northern China under government supervision is somewhat peculiarly treated, "being washed and dried by steam, which makes it very white" and secures for it a large price; "but the Chinese consider that this treatment deteriorates it medicinally."

Mr. Pike elsewhere states² that this process is applied to the root immediately after it is dug and washed, and that it makes it more transparent.

Another authority,³ referring apparently to the same Chinese article,

¹ Jartoux, Father, loc. cit., p. 246.

² Scientific American, Vol. LXIV, p. 69 (1891).

³ J. J. F. Bandinel, United States Consular Reports, loc. cit., p. 234.

states: "It is cured by steaming in a steaming basket. If intended for use in the south, sugar is added; if for use in the north, no sugar."

The treatment thus described is doubtless that which is most properly called "clarification." But it seems plain that this term is also applied to a process merely of cleansing and selection. Thus in Mr. Shepard's report (see p. 11), the root is said to average when crude about \$2 per pound; when clarified, from \$4 to \$6; when reclarified, from \$6 to \$8. Comparing this statement with Mr. Cheshire's graded valuation (see p. 11), it seems clear that Mr. Shepard's clarified and reclarified are both included in Mr. Cheshire's crude, which is said to constitute the bulk of American shipments. Mr. Cheshire's report intimates that a small portion of the American import is clarified in the proper sense, but we are unable to furnish details of the process beyond those given above. Doubtless American skill can produce an article by some such method which would be acceptable to the Chinese, but it would hardly be wise to undertake steaming on a large scale without fuller information or careful experiment.

PROFITS.

The following extract will give some idea of the profits which may be hoped for by a judicious grower of ginseng. Mr. George Stanton says:¹

I have recently taken the roots from three beds (3 by 16 feet each) which had been in cultivation, one five years, the others four years. The combined product of the three beds was 1,074 roots which weighed 73 pounds; from these I assorted out 833 roots, 20 pounds, for transplanting again, leaving 53 pounds of clean washed roots to be dried for market which made 17 pounds dry, which I have sold for \$4 per pound, 50 cents per pound more than common wild root sold for. It will be observed that the stock has only been decreased 241 roots. The 833 roots taken off for replanting were much larger than the roots with which the beds were originally stocked. The seed produced from the three beds during the time was worth at least \$40.

While the ginseng industry thus seems to be a promising one, it must be borne in mind that it may easily be overdone. The consumption of ginseng, though large, is at best, limited, and the market may easily be glutted, as indeed, it sometimes has been already. On the other hand, this is a crop which can be grown incidentally to general farming without a great outlay of capital. Further, if there should be a temporary decline in price, the grower can leave his roots in the ground, knowing that they are improving in quality. It is to be considered, too, that the novel and still somewhat experimental character of ginseng culture will tend to prevent any general rush into it, while many who undertake it without sufficient care or patience will fail.

¹ Loc. cit.

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